

## Contributors to This Issue

ROBERT H. BRANDT, Stevens Institute of Technology; Bell Telephone Laboratories, 1944—. His work in the radio research group has been concerned with components for microwave radio relay systems, antenna impedance measurements, multiplexing system for light route microwave relay, phase correction and pulse timing circuits and the Project Echo satellite communication experiments.

ARTHUR B. CRAWFORD, B.S. in E.E., 1928, Ohio State University; Bell Telephone Laboratories, 1928—. He has specialized in radio research, including work with measuring techniques, propagation, and antenna studies in the ultra-short wave and microwave areas. He designed the horn-reflector antenna used in the Project Echo satellite communication experiments. Fellow I.R.E.; member Eta Kappa Nu, Pi Mu Epsilon, Sigma Xi, Tau Beta Pi.

ROBERT W. DE GRASSE, B.S., 1951, California Institute of Technology; M.S., 1954, and Ph.D., 1958, Stanford University; Bell Telephone Laboratories, 1957-60; Microwave Electronics Corp., 1960—. Mr. DeGrasse's work at Bell Laboratories was in research and development of solid state masers. He took part in the development of the ruby maser used in the Bell Laboratories receiving system for the Project Echo satellite communication experiments. Member I.R.E., Sigma Xi.

OWEN E. DE LANGE, B.S., 1930, University of Utah; M.A., 1937, Columbia University; Bell Telephone Laboratories, 1930—. He has specialized in radio research, including development of high-frequency transmitters and receivers, and frequency modulation research. During World War II he was engaged in radar development, and later he worked on broadband and pulse systems. He was in charge of the design and construction of the radar used in tracking the artificial satellite in the Project Echo satellite communication experiments. Member I.R.E.

JOHN A. GITHENS, B.S.E.E., 1951, Drexel Institute of Technology; Bell Telephone Laboratories, 1951—. He has been engaged primarily in computer research, especially applied to military systems. This has included design of solid state circuits, computer systems and logical

design. He took part in the design and development of the Tradic and Leprechauu computers, early transistorized computers. He supervised work on the logical design of the data conversion unit used in the Project Echo satellite communication experiments. Member I.R.E., Eta Kappa Nu, Phi Kappa Phi, Tau Beta Pi.

D. C. HOGG, B.Sc., 1949, University of Western Ontario; M.Sc., 1950, and Ph.D. 1953, McGill University; Bell Telephone Laboratories, 1953—. His work has included studies of artificial dielectrics for microwaves, diffraction of microwaves, and over-the-horizon and millimeter wave propagation. He was concerned with evaluation of sky noise and analysis of performance characteristics of microwave antennas most recently. Senior member I.R.E.; member Commission 2, U.R.S.I.; Sigma Xi.

LOYD E. HUNT, A.B., 1927, Reed College; M.S., 1949, Stevens Institute of Technology; Bell Telephone Laboratories, 1929—. He has concentrated on radio research, including propagation and antenna studies and design of antennas. During the war he was engaged in preliminary work on the proximity fuse and in work on countermeasures and some jamming devices. After the war he worked on microwave relay projects, some involving studies of frequency measurements. More recently he did antenna work connected with the early warning system and he is presently engaged in research on low-noise antennas. Senior member I.R.E.

WILLIAM C. JAKES, B.S. in E.E., 1944; M.S. in E.E., 1947, and Ph.D., 1949, Northwestern University; Bell Telephone Laboratories, 1949—. He has been engaged in research in microwave radio antennas and microwave propagation. He was project engineer in charge of the Bell Laboratories team participating in the Project Echo satellite communication experiments. He is presently working on the planning of other experiments in satellite communications and radio astronomy. Member I.R.E., Eta Kappa Nu, Pi Mu Epsilon, Sigma Xi.

LYNDEN U. KIBLER, B.S., 1950, U.S. Coast Guard Academy; M.S. in E.E., 1956, Massachusetts Institute of Technology; Bell Telephone Laboratories, 1956—. His first work was concerned with microwave diode studies and with microwave logic design. He was engaged in visual systems work for a short time before returning to radio research and parametric amplifier studies. He was concerned with the design and construction of parametric amplifiers which were used in the Holmdel receiver and the Goldstone tracking radar for the Project Echo experiments.

RICHARD KLAHN, B.S.E.E., 1957, University of Buffalo; M.S. in E.E., 1959, New York University; American Telephone and Telegraph Company, 1948-55; Bell Telephone Laboratories, 1956—. With A.T.&T. in Buffalo, New York, he was a transmission test man, concerned with testing and locating troubles on long distance circuits. Since joining Bell Laboratories he has been engaged in studies of digital systems, with emphasis on digital-to-analog conversion techniques. He took part in the development of a data conversion unit used by Bell Laboratories in the Project Echo experiments. Member I.R.E.

JOSEPH J. KOSTELNICK, Bell Telephone Laboratories, 1955—. His first work was in development of microwave ferrite devices. Since 1959 he has been engaged in work on maser development.

J. A. NORTON, B.A.Sc., 1957, University of Toronto; A.M., 1959, Princeton University; Bell Telephone Laboratories, 1960—. He has been engaged in design of a high-accuracy instrument servo used in the digital-to-analog conversion unit developed for Bell Laboratories work in Project Echo. He is also engaged in research in adaptive control systems and process identification. Member I.R.E., Sigma Xi.

EDWARD A. OHM, B.S., 1950; M.S., 1951, and Ph.D., 1953, University of Wisconsin; Bell Telephone Laboratories, 1953—. He has been concerned with fundamental studies in guided-wave techniques, which has resulted in the design of high-quality microwave circulators, isolators, and waveguide filter networks. He was alternate general coordinator and was responsible for the receiving operation at Bell Laboratories during the Project Echo satellite communication experiments. Member I.R.E., Sigma Xi, Tau Beta Pi.

C. L. RUTHROFF, B.S. in E.E., 1950, and M.A., 1952, University of Nebraska; American Telephone and Telegraph Company, Long Lines, 1946-52; Bell Telephone Laboratories, 1952—. Since transferring from Long Lines in Lincoln, Nebraska, where he was a central office maintenance man, Mr. Ruthroff has concentrated on radio research with emphasis on FM problems and transistor circuits for microwave components and systems. He took part in the design and construction of the receivers used at Bell Laboratories and Jet Propulsion Laboratories at Goldstone, California, for the Project Echo experiments. He supervised the operation of the receiving equipment at Goldstone. Member I.R.E.

J. PETER SCHAFER, B.S.E.E., 1921, and E.E., 1925, Cooper Union; Western Electric Co., 1915-25; Bell Telephone Laboratories, 1925—. His

first work was in vacuum tube development. Since 1918 he has specialized in radio research, taking part in the installation, testing, and operation of the first long-wave transatlantic radio telephone circuit. He studied radio transmission characteristics of the upper atmosphere, high-power transmitter and antenna problems of radar during the war, and for a number of years has been engaged in work on microwave repeater components. He was in charge of the installation and operation of the Bell Laboratories Project Echo transmitter. Senior member I.R.E.

H. E. D. SCOVIL, B.A., 1948, and M.A., 1949, University of British Columbia; D. Phil., 1951, Oxford University; Nuffield Research Fellow, Oxford, 1951-52; faculty, University of British Columbia, 1952-55; Bell Telephone Laboratories, 1955—. He has been engaged in development of solid state devices at microwave frequencies. He took part in designing the maser amplifier used in the Project Echo receiving equipment at Holmdel.

HAROLD SEIDEL, B.E.E., 1943, College of the City of New York; M.E.E., 1947, and D.E.E., 1954, Polytechnic Institute of Brooklyn; Federal Telecommunications Laboratories, 1948-53; Bell Telephone Laboratories, 1953—. His work has related particularly to microwave solid state interactions and has ranged from the study of ferrite propagation phenomena to semiconductor parametric amplification. Member I.R.E., Sigma Xi.

MICHIYUKI UENOHARA, B.E., 1949, Nihon University (Japan); M.S., 1953, and Ph.D., 1956, Ohio State University; D.E., Tohoku University (Japan), 1958; Bell Telephone Laboratories, 1957—. He has been engaged in exploratory studies of microwave variable reactance amplifiers and microwave tubes. He was also engaged in microwave tube research at Nihon University from 1949 to 1952, and taught there in 1957. Member American Physical Society, I.R.E., Institute of Electrical Communication Engineers (Japan), Eta Kappa Nu, Pi Mu Epsilon, Sigma Xi, R.E.S.A.

K. L. WARTHMAN, B.M.E., 1939, Ohio State University; Bell Telephone Laboratories, 1939—. Mr. Warthman was engaged in design of maintenance tools and gauges for a number of years. Since 1951 his work has been in military electronics, and he has been especially concerned with design of camera equipment for Nike and Titan missile projects. He worked on the tracking cameras for the radars associated with the receiving and transmitting antennas used by Bell Laboratories in the Project Echo experiments.